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not invoke the relevant Web page at his own discretion. The reproducible signal may be a displayable video sub-image, for example, a pictogram. It may also be an audible sound signal, for example, a beep.

An embodiment of the method further comprises the step of transmitting a
5 table of contents identifying the trigger data transmitted during the program. It is thereby achieved that the viewer is informed in advance about the triggers he can expect during the program and to which additional information he will be alerted, even if the information items themselves have not yet been transmitted and received. The table of contents is accessible during the full length of the program. After a trigger has been passed, the viewer may
10 (re)inspect the information still in the context of the television program. Access at a later stage may be along a different path than access during the alerting period in which the trigger is displayed. The table of contents is preferably repetitively transmitted throughout the program in order that it is also available for people who started to watch the program later.

Advantageously, the availability of the table of contents is also signalled
15 to the user by the transmission of an appropriate trigger.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 shows schematically a transmission system comprising a transmitter and a receiver in accordance with the invention.

20 Fig.2 shows the transmission format of additional information transmitted by the transmitter shown in Fig.1.

Fig.3 shows the transmission format of trigger data transmitted by the transmitter shown in Fig.1.

Fig.4 shows the transmission format of a table of contents transmitted by
25 the transmitter shown in Fig.1.

Fig.5, composed of Figs. 5A and 5B, shows an example of data transmitted along with the television signal during a television program broadcast by the transmitter shown in Fig.1.

Fig.6 shows a flow chart of a program stored in and executed by a
30 microprocessor in the receiver shown in Fig.1.

Fig.7 shows examples of a television screen illustrating the features of the invention.

Transmission and reception of television programs

FIELD OF THE INVENTION

The invention relates to a method of transmitting and receiving television programs. The transmission includes additional information items related to said television programs and trigger data for selectively invoking said information items.

5

BACKGROUND OF THE INVENTION

- A known method as defined in the opening paragraph is disclosed in "Intercast Brings the Web to TV", PC Magazine, January 21, 1997, pp. 203-204. This article describes a method of transmitting Web pages along with a standard television signal.
- 10 The Web pages provide additional information on what is being broadcast at a particular time. They are downloaded and cached in a receiver's memory. The transmission also includes trigger data (hereinafter also denoted as "triggers") which cause cached pages to be pulled up for display. Said triggers allow the broadcaster to download the pages well in advance and display them at the right moment in the television program. For example,
- 15 during a commercial for a product, a Web page is pulled up that provides more product information such as available sizes or colors.

- The television program, a directory of Web pages, and a selected Web page are displayed in distinct windows of the receiver's display screen. If the television program were displayed in the full screen mode, the user would remain unaware of the Web
- 20 page that is actually being pulled up. Furthermore, the window showing the directory of Web pages is created by the receiver and necessarily lists only the pages which have already been received.

OBJECT AND SUMMARY OF THE INVENTION

- 25 It is an object of the invention to further improve the prior-art system.

- To this end, the method according to the invention is characterized in that the trigger data includes a reproducible signal for reproduction by the receiver. This allows the receiver to reproduce said signal upon reception of the trigger and thus to inform the public that additional information about a current event in the program is accessible, even if
- 30 the television program is being viewed in the full screen mode. Thus the user may or may

DESCRIPTION OF EMBODIMENTS

Fig.1 shows schematically a transmission system in accordance with the invention. The system comprises a transmitter 1 and at least one receiver 2 connected together through a channel 3. The channel 3 may be a broadcast channel, for example, a satellite connection, a terrestrial broadcast network or a cable. As the advantageous effects of the invention are also achieved when playing back a prerecorded program from a storage medium, the channel 3 may also be such a storage medium, for example, a magnetic tape or an optical disc on which the output signal of the transmitter has been recorded. Optionally, a second channel 4 (return channel or bi-directional channel) between the transmitter and the receiver is provided in the form of the Public Switched Telephone Network PSTN or Integrated Service Digital Network ISDN.

The transmitter 1 comprises a television signal source 10 which is shown in the Figure as a studio tape recorder playing back a prerecorded television program. The television signal TV from the source 10 is encoded by an MPEG encoder 11 into a digital MPEG television signal MP. The transmitter further comprises a first storage medium 12 and a second storage medium 13. The first storage medium 12 stores a number of Web pages W with additional information related to the television program. The second storage medium 13 stores trigger data items T for invoking said Web pages and a table of contents TOC. In practice, both storage media 12 and 13 will be sections of a single hard disk unit. The triggers T and selected ones of the Web pages W are read from the respective storage media in synchronism with the television program under the control of synchronization signals S delivered by the signal source 10. They are multiplexed with the digital television signal MP by means of a multiplexer 14 into an MPEG Transport Stream TS and transmitted to the receiver 2. Optionally, the transmitter also comprises an Internet access terminal 15 which enables receivers to access the Web pages W stored in the first storage medium 12 through the Public Switched Telephone Network 4.

The receiver 2 comprises a demultiplexer 20 which separates the encoded television signal MP from the triggers T, table of contents TOC, and Web pages W. The television signal MP is applied to an MPEG decoder 21 which decodes the audio component A for reproduction by a speaker 22 and the video component V for full-screen display on a display screen 23. The triggers T, table of contents TOC, and Web pages W are applied to a microprocessor 24 which is arranged to store these types of data in a memory 25 for subsequent processing. The microprocessor is arranged to store selected information in a

predetermined display section of the memory 25. The data in said display section is converted by a character generator 26 into a displayable graphics signal G which is applied to a combiner stage 27 for display on the screen 25, solely or in combination with the video signal V. The microprocessor 24 is further connected to a (remote) control unit 28 and,
5 optionally, a modem 29 for accessing the Internet.

Fig.2 shows the transmission format of Web pages W transmitted by the transmitter 1. A type field 100 identifies the type of information which is the character "W" for Web pages in this example. An address field 101 defines an address (here a file name) by which the pages are retrieved from the broadcast signal and stored in the receiver's memory.
10 Numeral 102 denotes the contents of the page made up in the popular HTML format (HyperText Mark-up Language).

Fig.3 shows the transmission format of the triggers T transmitted by the transmitter. For triggers, the type field 100 is the character "T". A display data field 103 defines (or refers to) a reproducible data signal such as a visual pictogram or an audible
15 signal. The same field can also define how long the signal must be reproduced. A link field 104 defines the location where the Web page to which the trigger is linked can be found. For the purpose of disclosing this invention, the link field 104 has one of two formats. The format <http://www.X/Y> refers to Web page Y of content provider X on the Internet. The format <dvb://X/Y> refers to Web page Y which is transmitted along with the television signal
20 transmitted by broadcast station X.

The operation of the system shown in Fig.1 will now be described with reference to an example. In this example, a classical concert is being broadcast. A plurality of Web pages with additional information related to the television program are transmitted during the broadcast for consultation by the user if he so wishes. Some of these pages are
25 transmitted along with the television signal, others can only be accessed through the Internet. The following Web pages with additional information related to the concert are accessible in this example:

- information about the composer to whom the concert is dedicated,
- information about the conductor,
- 30 - information about each individual piece of music (Piano concert No.1 and Symphony No.5, respectively, in this example),
- the orchestral layout,
- an order form for purchasing a CD of the concert, and
- an order form for purchasing a ticket for a forthcoming concert.

The broadcaster informs the user about the availability of these Web pages by transmitting respective triggers at adequate points of time during the concert. Upon reception of a trigger, the receiver displays the pictogram or reproduces the audible signal which is defined in the trigger's display data field 103 (see Fig.3). The pictogram is displayed in the (full-screen) television image area. The user may then access the relevant Web pages by simply clicking the pictogram or pressing a dedicated button on the remote control unit. Three types of triggers can be identified:

- Static triggers relate to the television program as a whole.
- Dynamic triggers relate to a current event in the program.
- 10 - Living triggers are a combination of a static trigger and a dynamic link. The visualization of the trigger remains unchanged but the actual link field 104 adapts to the action in the program.

The triggers being transmitted and presented during the program are listed together in a table of contents. Fig.4 shows the transmission format of tables of contents. They are identified by the character "TOC" in their type field 100. The type field is followed by a list of triggers, each comprising a display data field 103 and a link field 104. In the TOC, the link field 104 may be empty, for example, if the relevant Web page has not yet been broadcast. Upon reception by the receiver, the TOC will be stored at a predetermined memory location, for example, under the reserved file name "toc". An address field similar to the address field 101 shown in Fig.2 can therefore be dispensed with.

In the example of the TOC shown in Fig.4, seven triggers 41-47 are listed which will be transmitted during the classical concert broadcast. Initially, i.e. at the beginning of the program when the TOC is transmitted prior to the transmission of any of the above-mentioned Web pages with program-related additional information, all of the respective link fields 104 refer to Web pages on the Internet. This allows the user to consult the relevant Web pages already at the beginning of the concert if he so wishes. However, as will be explained hereinafter, the TOC is regularly transmitted with updated link fields.

Fig.5 (which is composed of Figs. 5A and 5B) shows the actual data (tables of contents TOC, Web pages W, triggers T) that are transmitted along with the television signal during the classical concert broadcast. Numeral 51 denotes the first transmission of the table of contents. At this stage, all link fields in the TOC refer to Web pages on the Internet as shown in Fig.4. Numeral 52 denotes the transmission of a trigger T enabling the user to access the TOC which has just been received. The link field of this trigger is "toc" which is the reserved file name for the table of contents. The trigger 52 is an example of a static

trigger. The relevant pictogram remains displayed during the whole program, for example, in an upper corner of the television image. Alternatively, the TOC can be accessed by pressing a dedicated information button (281 in Fig.1) on the remote control unit.

5 Numeral 53 denotes the transmission, at the beginning of the program (e.g. during announcements), of a Web page with background information about the composer to whom the concert is dedicated. The page is stored in the receiver under the file name "composer". Then, a trigger 54 is transmitted which causes the embedded pictogram to be inserted into the television image for a defined period of time. The user may click the pictogram and cause the composer Web page to be read from the memory and displayed on
10 the screen.

Numeral 55 denotes the transmission of an updated version of the table of contents. The updated TOC differs from the first version in that the link field of the composer trigger (41 in Fig.4) is changed from an Internet link (<http://www.bbc.composer>) to a link to the broadcast page (<dvb://bbc1/composer>). Accordingly, if the user accesses the
15 composer page via the TOC at a later stage, the receiver will acquire the page from the local memory rather than from the Internet, as was the case at the very beginning of the program.

When the first notes of the first piece of music (Piano Concert No.1) are being broadcast, the transmitter transmits a Web page 56 with background information about this piece of music, which is followed by the transmission of a trigger 57. As long as the relevant
20 pictogram is displayed, the viewer can consult the respective page by simply clicking the pictogram. As is shown in the Figure, the page is stored under the file name "curpiece". Subsequently, the table of contents is updated by transmitting a new TOC 58 in which the link field 104 of trigger 44 (see Fig.4) has been changed from <http://www.bbc/piano1> to <dvb://bbc1/curpiece>.

25 During the first piece of music, a Web page 59 showing a layout of the orchestra and a Web page 60 with background information about the conductor of the orchestra are transmitted and stored in the receiver. Their transmission is followed by an update 61 of the TOC in which the link field of layout trigger 43 (see Fig.4) has been changed from <http://www.bbc/orchlayout> to <dvb://bbc1/orchlayout>, and the link field of
30 conductor trigger 42 (see Fig.4) has been changed from <http://www.bbc/conductor> to <dvb://bbc1/conductor>. The triggers T for invoking these Web pages by clicking the relevant pictogram are denoted 62 and 63 in the Figure. They are transmitted at appropriate moments during the program, i.e. during a close-up view of the conductor and a global view of the

orchestra, respectively. Note that the other information items such as the composer page can be accessed at any time via the table of contents. To this end, the user clicks the TOC pictogram or presses the information button and selects a desired pictogram from the table of contents which is displayed in response thereto.

5 Reference numeral 64 denotes the transmission of a Web page with information about the second piece of music (Symphony No.5). Numeral 65 denotes a trigger for invoking this page which is transmitted when this piece is being played. In this example, the Symphony No.5 page replaces the Piano Concert No.1 page because both pages have the same file name "curpiece". This is not essential but is shown to illustrate the flexibility of
10 the invention. Although the trigger associated with the Piano Concert No.1 will no longer be transmitted, the information remains accessible to the user via the Internet. To this end, the link field of trigger 44 in the table of contents (see Fig.4) is restored to its original value <http://www.bbc/piano1> in an updated version 66 of the TOC. While Symphony No.5 is being played, triggers 67 and 68 for invoking the conductor and orchestral layout pages are again
15 transmitted during a close-up view of the conductor and a global view of the orchestra, respectively.

 At the end of the program, announcements are made about the possibility to buy a CD of the concert and a ticket for the next concert in the concert hall. During these announcements, triggers 69 and 70 are transmitted. Clicking the corresponding pictogram
20 causes the receiver to establish an Internet connection with a CD shop or the concert hall, respectively, allowing him to order the CD or ticket. Finally, a new TOC 71 is transmitted in which all link fields are given their initial value as shown in Fig.4. After the program has finished, the viewer is thus still kept informed about the program's additional information and he can still access the Web pages via the Internet.

25 Although the receiver 2 (see Fig.1) has already been described functionally in the above example, its operation will now be described in more detail. The operation of the receiver is determined by a program which is stored in, and executed by, the microprocessor 24. Fig.6 shows a flow chart illustrating this program. References in this description which are made to various circuit elements of the receiver refer to the schematic diagram shown in
30 Fig.1. In the flow chart, numeral 200 denotes a reset operation which is carried out when the receiver is tuned to a television program. In a step 201, the microprocessor awaits reception of a data item (W, T, TOC) from the multiplexer 20 or reception of a control command (C)

from the remote control unit 28. If a data item is received, the program proceeds with step 210. If a control command is received, the program proceeds with step 220.

In the step 210, the microprocessor reads the type field of the received data item. If the type field is "W", the data item is a broadcast Web page. In a step 211, said
5 page is stored in the receiver's memory 25 under the file name which is included in the address field of the Web page. If the type field is "T", the data item is a trigger. In a step 212, the microprocessor stores the pictogram embedded in the display data field in the display section of memory 25. In response thereto, the character generator 26 displays the pictogram as an overlay over the television image. The link field of the trigger is also saved
10 in memory. If the type field is "TOC", the data item is a table of contents. In a step 213, said table is stored in memory 25 under the file name 'toc'. After thus having processed a received data item, the program returns to the step 201 to await further events.

In the step 220, the microprocessor investigates whether the received control command is a toggle command to switch the display of the table of contents on or off. The
15 relevant command is issued by pressing a special i-button (281 in Fig.1) of the remote control unit or pointing-and-clicking the i-pictogram in the upper right corner of the television screen. Then a step 221 is executed in which the table of contents is displayed or, if the TOC is already displayed, erased.

Other control commands are point-and-click operations for navigating through
20 the information associated with the television program. In a step 222, the link field associated with the pictogram being clicked is read. This applies to triggers that have just been received as well as triggers that are listed in the table of contents. In a step 223, the microprocessor determines whether the link field is filled in and, if this is the case, whether it represents an Internet address (http://...) or a broadcast address (dvb://...). In the table of
25 contents, link fields may initially be empty. In that case, the microprocessor generates an on-screen-display message informing the user that the selected information item will be transmitted and received later during the program. The user is thus informed about information still to come.

If the link field is an Internet address, a step 224 is carried out in which the
30 microprocessor activates modem 29 for establishing an Internet connection with the relevant provider. If the receiver has no modem, the user may be informed that the desired information will possibly be transmitted and received later.

If the link field represents a broadcast address, the microprocessor checks in a step 225 whether a page with the associated file name is stored in the receiver's memory 25. This will usually be the case, and the microprocessor will transfer the stored page to the display section in a step 226. If the page is not locally available yet, a step 227 is performed in which the user is given an appropriate message that the page is being looked for in the received television signal. Optionally, the receiver may keep a copy of the initial version of the table of contents (see Fig.4) for offering the user an alternative location of the desired information. As an additional option, the transmitter may transmit for this purpose a special backup version of the table of contents in which all link fields refer to Internet Web pages only. Such an option is very useful for viewers who have tuned to the program at a later stage.

Fig.7 shows an example of television screens during the concert. In screen 75, the conductor trigger has just been transmitted. The corresponding pictogram 71 is displayed, and the viewer can access more information about the conductor by clicking the pictogram. In the upper right corner, the i-pictogram 70 for accessing the table of contents is displayed. Screen 85 shows the result of pointing and clicking said i-pictogram. It causes the display data fields 80 of the triggers listed in the table of contents to be displayed.

In summary, a television transmitter transmits additional information in the form of Web pages along with the television signal. The transmission further includes triggers (71) for selectively invoking said Web pages in synchronism with the program. The triggers include (or refer to) a perceptible signal, e.g. a pictogram or an audible beep. In response to receiving a trigger, a receiver reproduces said perceptible signal without substantially disturbing the television screen. The user is thus timely alerted about additional information related to the television program when viewing it. Thus, he may or may not invoke the relevant Web page at his own discretion. To inform the public in advance of the triggers that will be broadcast and to provide easy access to the Web pages at an earlier or later stage, the transmission further includes a table of contents (80) identifying the triggers that are being transmitted during the program. The table of contents itself may be invoked by a trigger (70).

Claims

1. A method of transmitting television programs (TV) to at least one receiver, including the steps of transmitting additional information items (W) related to said television programs and trigger data (T) for selectively invoking said information items, characterized in that the trigger data includes a reproducible signal (103) for reproduction by the receiver.
- 5 2. A method as claimed in claim 1, wherein the reproducible signal is a displayable video sub-image.
3. A method as claimed in claim 1, wherein the reproducible signal is an audible sound signal.
4. A method as claimed in claim 1, further comprising the step of transmitting a
10 table of contents (TOC) identifying the trigger data being transmitted during the program.
5. A method as claimed in claim 4, wherein the table of contents is repetitively transmitted throughout the television program.
6. A method as claimed in claim 4, including the step of transmitting trigger data for invoking said table of contents.
- 15 7. A method of receiving television programs, comprising the steps of receiving and storing additional information items related to said television programs and receiving trigger data for selectively invoking said information items, characterized by reproducing a reproducible signal included in the trigger data upon reception of said trigger data and invoking said information item in response to a predetermined user-operable command.
- 20 8. A method as claimed in claim 7, wherein the reproducible signal is a displayable video sub-image, comprising the step of displaying said sub-image within the image area representing the television program.
9. A method as claimed in claim 7, comprising the step of receiving and storing a table of contents identifying the trigger data transmitted during the program, displaying said
25 table of contents and invoking stored information items in response to selecting respective trigger data from said table of contents.
10. A transmitter for transmitting television sprogram to at least one receiver, comprising means for transmitting additional information items related to said television

programs and trigger data for selectively invoking said information items, characterized in that the trigger data includes a reproducible signal for reproduction by the receiver.

11. A transmitter as claimed in claim 10, further comprising means for transmitting a table of contents identifying the trigger data transmitted during the program.

5 12. A receiver for receiving television programs, comprising means for receiving and storing additional information items related to said television programs and receiving trigger data for selectively invoking said information items, characterized by means for reproducing a reproducible signal included in the trigger data upon reception of said trigger data and invoking said information item in response to a predetermined user-operable
10 command.

13. A receiver as claimed in claim 12, wherein the reproducible signal is a displayable video sub-image, comprising means for displaying said sub-image within the image area representing the television program.

14. A receiver as claimed in claim 12, comprising means for receiving and storing
15 a table of contents identifying the trigger data transmitted during the program, displaying said table of contents and invoking stored information items in response to selecting respective trigger data from said table of contents.

15. A television signal including additional information items related to said television programs and trigger data for selectively invoking said information items,
20 characterized in that the trigger data includes a reproducible signal for reproduction by the receiver.

16. A signal as claimed in claim 15, further including a table of contents identifying the trigger data transmitted during the program.

17. A storage medium on which a television signal as claimed in claim 15 or 16 is
25 stored.

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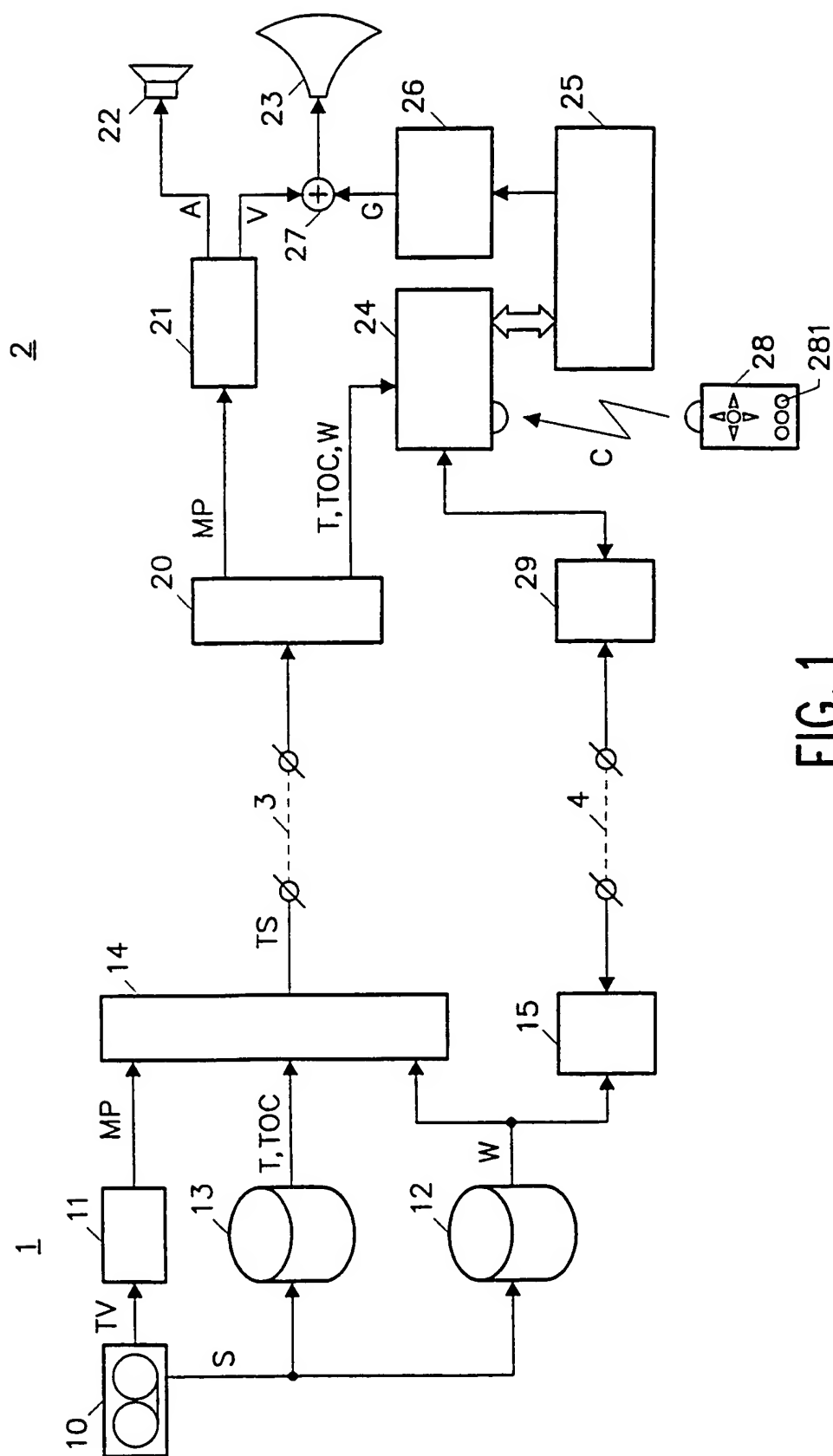


FIG. 1

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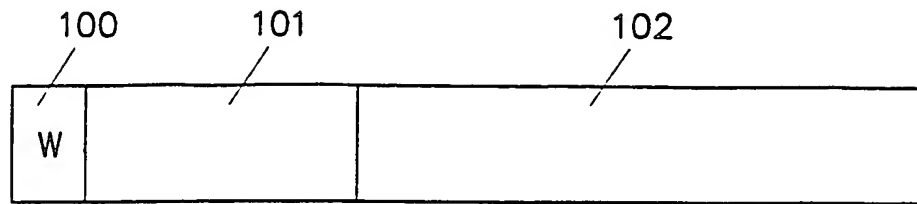


FIG. 2

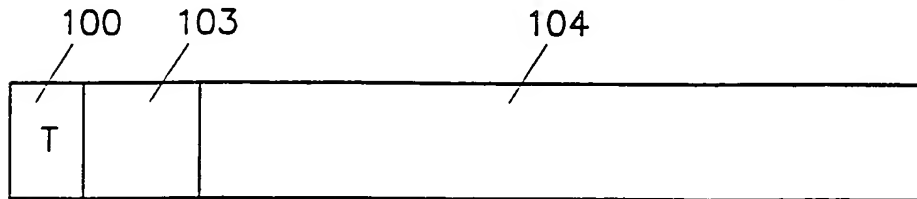


FIG. 3








| | | |
|---|---|----|
| 100 TOC | | |
|  | http://www.bbc/composer | 41 |
|  | http://www.bbc/conductor | 42 |
|  | http://www.bbc/orchlayout | 43 |
|  | http://www.bbc/piano1 | 44 |
|  | http://www.bbc/symphono5 | 45 |
|  | http://www.shoponline/cdorder | 46 |
|  | http://www.hall/ticket | 47 |
| 103 | 104 | |

FIG. 4






| | | | |
|-----|---|------------------------|----|
| TOC | | | 51 |
| T |  | dvb: //bbc1/toc | 52 |
| W | composer | | 53 |
| T |  | dvb: //bbc1/composer | 54 |
| TOC | | | 55 |
| W | curpiece | (Piano Concert No.1) | 56 |
| T |  | dvb: //bbc1/curpiece | 57 |
| TOC | | | 58 |
| W | orchlayout | | 59 |
| W | conductor | | 60 |
| TOC | | | 61 |
| T |  | dvb: //bbc1/conductor | 62 |
| T |  | dvb: //bbc1/orchlayout | 63 |

FIG. 5A

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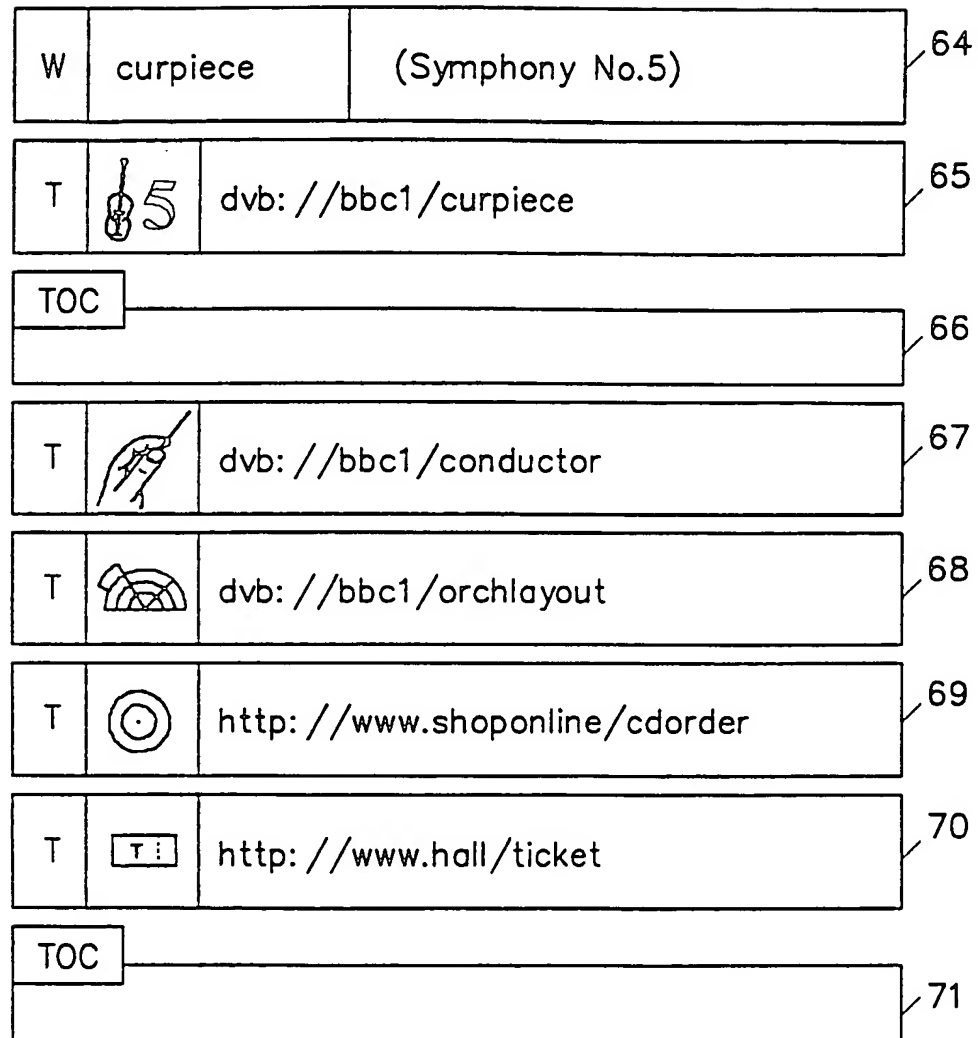


FIG. 5B

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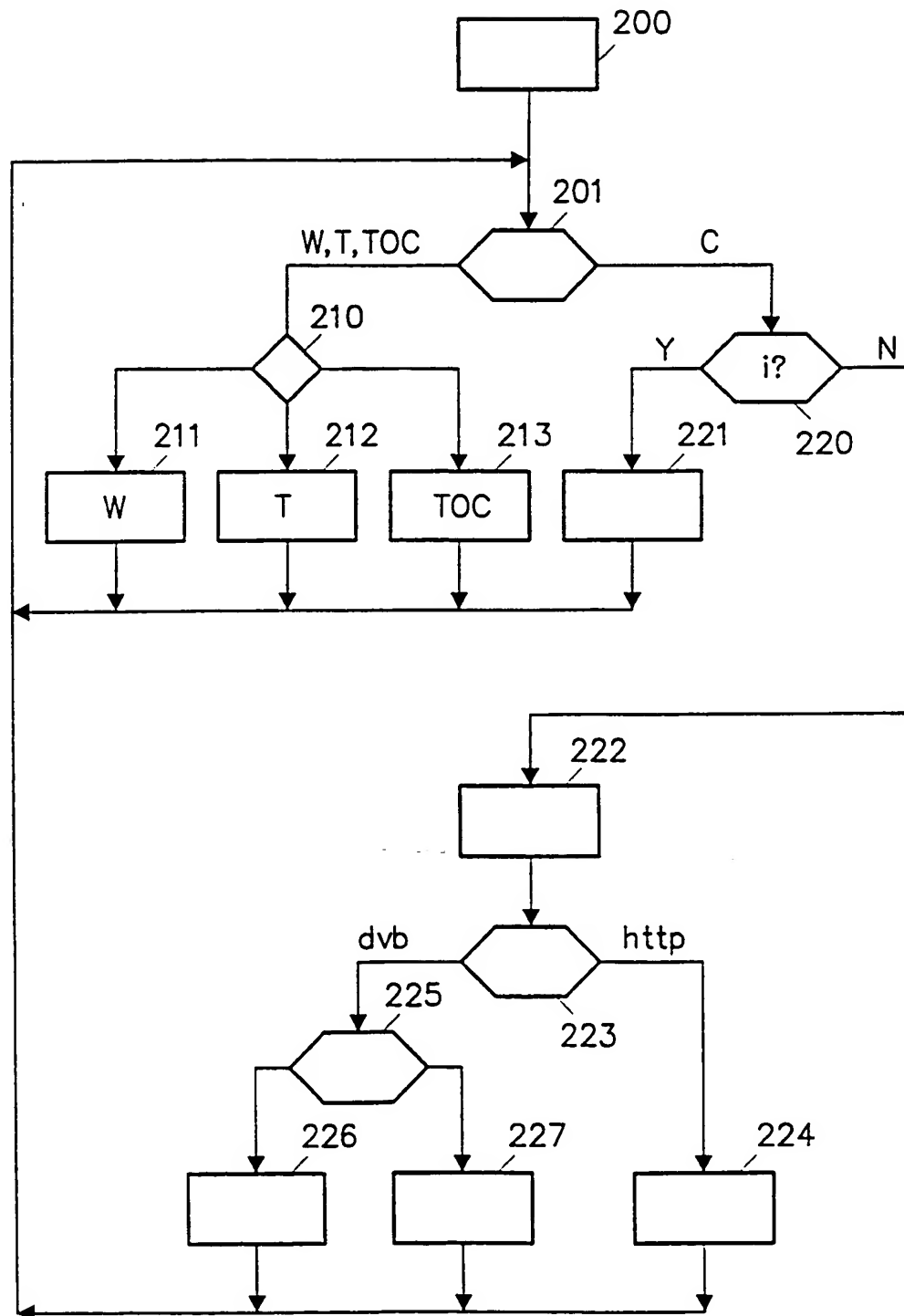


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 98/00580

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04N 7/173, H04N 5/445

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| X | WO 9641478 A1 (TV GUIDE ON SCREEN), 19 December 1996 (19.12.96), claims 1-5, abstract | 1-17 |
| | -- | |
| A | US 4488179 A (H. ECKHARD KRÜGER ET AL), 11 December 1984 (11.12.84), abstract | 1-17 |
| | -- ----- | |

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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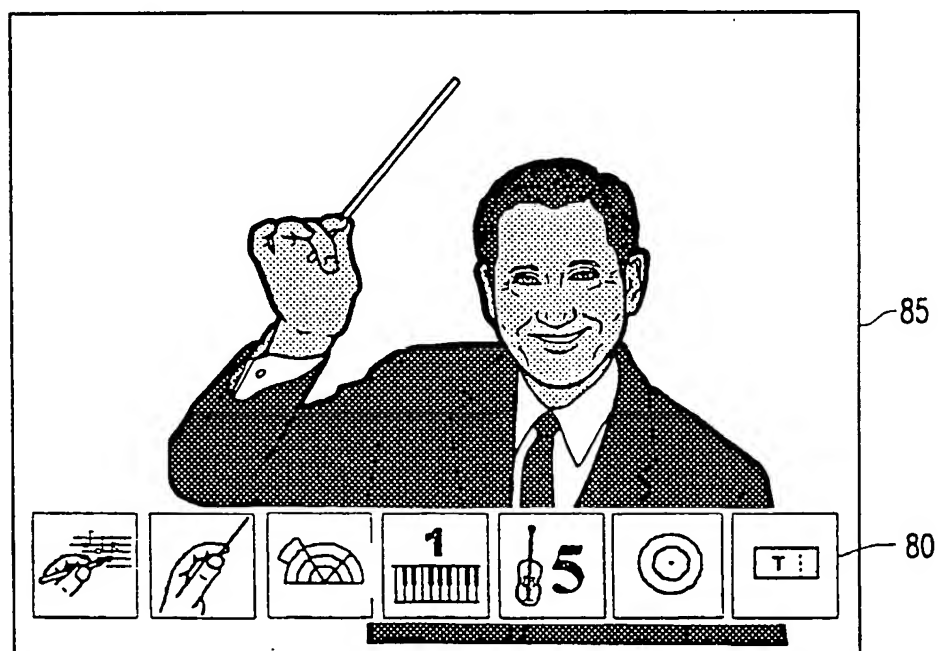
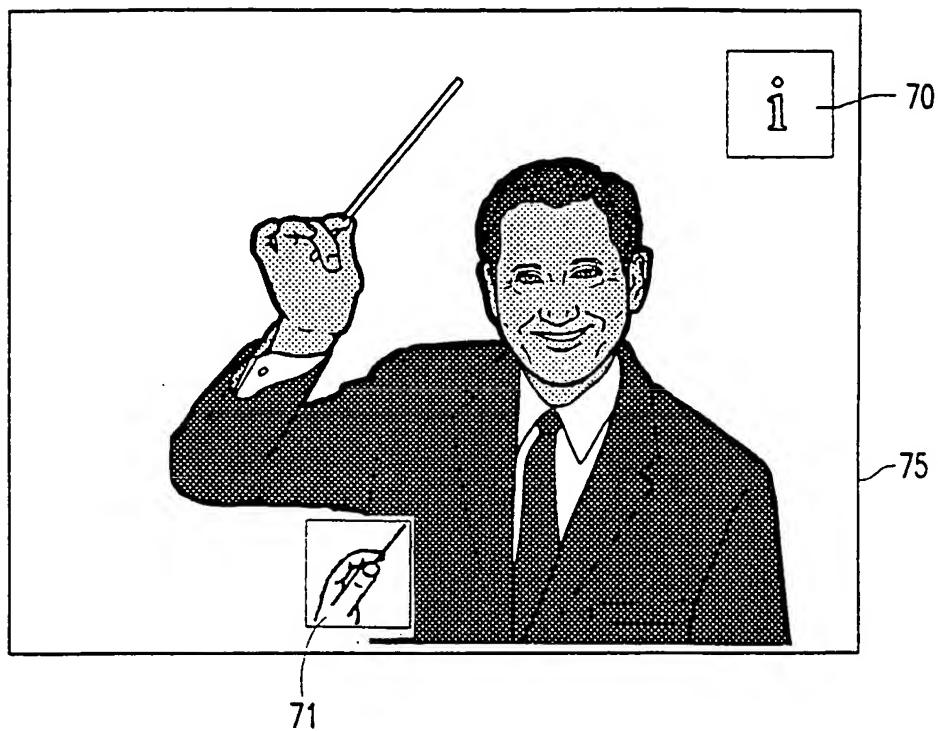


FIG. 7

INTERNATIONAL SEARCH REPORT

Information on patent family members

27/07/98

International application No.

PCT/IB 98/00580

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|----------------------------|---------------------|
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